RNA-binding protein CPEB1 remodels host and viral RNA landscapes.

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Public Summary:

Scientific Abstract:
Host and virus interactions occurring at the post-transcriptional level are critical for infection but remain poorly understood. Here, we performed comprehensive transcriptome-wide analyses revealing that human cytomegalovirus (HCMV) infection results in widespread alternative splicing (AS), shortening of 3' untranslated regions (3' UTRs) and lengthening of poly(A)-tails in host gene transcripts. We found that the host RNA-binding protein CPEB1 was highly induced after infection, and ectopic expression of CPEB1 in noninfected cells recapitulated infection-related post-transcriptional changes. CPEB1 was also required for poly(A)-tail lengthening of viral RNAs important for productive infection. Strikingly, depletion of CPEB1 reversed infection-related cytopathology and post-transcriptional changes, and decreased productive HCMV titers. Host RNA processing was also altered in herpes simplex virus-2 (HSV-2)-infected cells, thereby indicating that this phenomenon might be a common occurrence during herpesvirus infections. We anticipate that our work may serve as a starting point for therapeutic targeting of host RNA-binding proteins in herpesvirus infections.